Math 105 — Final Exam

December 14, 2012

Name: EXAM SOLUTIONS

Instructor: ______________________ Section: ____________

1. **Do not open this exam until you are told to do so.**
2. This exam has 12 pages including this cover. There are 13 problems. Note that the problems are not of equal difficulty, so you may want to skip over and return to a problem on which you are stuck.
3. Do not separate the pages of this exam. If they do become separated, write your name on every page and point this out to your instructor when you hand in the exam.
4. Please read the instructions for each individual problem carefully. One of the skills being tested on this exam is your ability to interpret mathematical questions, so instructors will not answer questions about exam problems during the exam.
5. Show an appropriate amount of work (including appropriate explanation) for each problem, so that graders can see not only your answer but how you obtained it. Include units in your answer where that is appropriate.
6. You may use any calculator except a TI-92 (or other calculator with a full alphanumeric keypad). However, you must show work for any calculation which we have learned how to do in this course.
7. If you use graphs or tables to find an answer, be sure to include an explanation and sketch of the graph, and to write out the entries of the table that you use.
8. **Turn off all cell phones, smartphones, and other electronic devices**, and remove all headphones.
9. You must use the methods learned in this course to solve all problems.

Problem	Points	Score
1	5	
2	6	
3	9	
4	12	
5	9	
6	9	
7	8	
8	12	
9	5	
10	4	
11	8	
12	8	
13	5	
Total	100	

1. [5 points] For each of the statements below, circle "**True**" if the statement is *definitely* true. Otherwise, circle "**False**". You do not need to show any work for this problem.

a. [1 point] If a function has more than one zero, then the function is not invertible.

[True] False

b. [1 point] If $x > 1$, then $100x^{100000} > e^{0.0001x}$.

True [False]

c. [1 point] If $h(t) = \ln(t)$ then $h^{-1}(t) = \dfrac{1}{\ln(t)}$.

True [False]

d. [1 point] If a function is concave up, then the function is increasing.

True [False]

e. [1 point] If $f(x)$ and $g(x)$ are both even functions, then the function $f(g(x))$ is also an even function.

[True] False

2. [6 points] Solve each of the equations below. *Show your work step-by-step and write the solutions in* **exact form** *in the answer blanks provided.*

a. [3 points] $5e^{2t+7} = 3(4^t)$

Solution: We first divide both sides of this equation by 5 to find $e^{2t+7} = 0.6(4^t)$. Then we use logarithms to find t.

$$\ln(e^{2t+7}) = \ln\left(0.6(4^t)\right)$$
$$2t + 7 = \ln(0.6) + \ln(4^t) = \ln(0.6) + t\ln(4)$$
$$2t - t\ln(4) = \ln(0.6) - 7$$
$$t(2 - \ln(4)) = \ln(0.6) - 7 \text{ so } t = \frac{\ln(0.6) - 7}{2 - \ln(4)}$$

Answer: $t = \dfrac{\ln(0.6) - 7}{2 - \ln(4)}$

b. [3 points] $\log(w) + \log(w + 3) = 1$

Solution: We apply a basic property of logarithms and then use the definition or the logarithm (or exponentiate) to solve for w.

$$\log(w) + \log(w + 3) = 1$$
$$\log(w(w + 3)) = 1$$
$$w(w + 3) = 10^1$$
$$w^2 + 3w = 10$$
$$w^2 + 3w - 10 = 0$$
$$(w - 5)(w + 2) = 0$$
$$w = 5 \text{ or } w = -2$$

However, note that $w = -2$ is not a solution to the original equation because -2 is not in the domain of $\log w$. Hence the only solution is $w = 5$.

Answer: $w = 5$

3. [9 points] Note that the problems on this page are not related to each other.
(*You do not have to show work. However work shown may be used to award partial credit.*)

a. [3 points] A salesperson at a local department store earns a base salary of $750 per month plus a commission (bonus) of 8% of her total sales. Let $M(d)$ be the employee's total earnings, in dollars, in a month in which she sells d dollars worth of merchandise. Find a formula for $M(d)$.

Answer: $M(d) =$ $750 + 0.08d$

b. [3 points] Suppose that the half-life of caffeine in a student's bloodstream is 5 hours. If the student drinks a latte that contains 150 mg of caffeine at 8 am, find a formula for $C(h)$, the amount of caffeine (in milligrams) from that latte that remains in the student's bloodstream h hours after 8 am.

Solution: $C(h)$ is exponential with initial value 150, so $C(h) = 150b^h$ where b is the decay factor of C. Since $75 = 150b^5$ we see that $b^5 = 0.5$ so $b = (0.5)^{1/5}$. Hence $C(h) = 150(0.5)^{h/5}$.

Answer: $C(h) =$ $150(0.5)^{h/5}$

c. [3 points] The monthly revenue of a local business varies seasonally from a low of $35,000 in February to a high of $75,000 in August (and back down to $35,000 the following February). Let $R(t)$ be this company's monthly revenue, in thousands of dollars, t months after January. (Note that $t = 0$ represents January, $t = 1$ represents February, etc.) Assuming that $R(t)$ is a sinusoidal function, find a formula for $R(t)$.

Solution: $R(t)$ is sinusoidal with an amplitude of 20 thousand dollars, an average value (corresponding to the midline) of 55 thousand dollars, and a period of 12 months. Since it attains a minimum value of when $t = 1$, we find the formula $R(t) = -20\cos(\frac{\pi}{6}(t-1)) + 55$. (There are many other possibilities.)

Answer: $R(t) =$ $-20\cos(\frac{\pi}{6}(t-1)) + 55$

4. [12 points]
Figure 1 below gives some data for an invertible function f and Figure 2 shows the entire graph of a function g. Use this information to answer the questions below.

x	0	1	2	3	4	5	6
$f(x)$	2	6	5	4	1	3	7

Figure 1

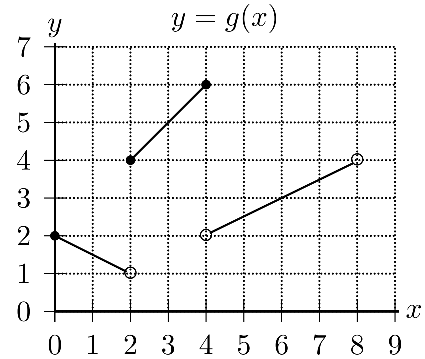


Figure 2

a. [3 points] What is the domain of g? What is the domain of g^{-1}?
(*Use either inequalities or interval notation to give your answers.*)
Domain of g: $[0, 8)$ **Domain of** g^{-1}: $(1, 6]$

b. [4 points]

i. Evaluate $3f(2) + 1$.

Solution: $3f(2) + 1 = 3(5) = 1) = 16.$

Answer: 16

ii. Evaluate $g(g(4))$.

Solution: $g(g(4)) = g(6) = 3.$

Answer: 3

iii. Evaluate $g(f(1) - 1)$.

Solution: $g(f(1) - 1)) = g(6 - 1) = g(5) = 2.5.$

Answer: 2.5

iv. Evaluate $f^{-1}(g^{-1}(3))$.

Solution: $f^{-1}(g^{-1}(3)) = f^{-1}(6) = 1.$

Answer: 1

c. [2 points] Find the average rate of change of $f(x)$ between $x = 2$ and $x = 5$.

Solution: The average rate of change of $f(x)$ between $x = 2$ and $x = 5$ is

$$\frac{f(5) - f(2)}{5 - 2} = \frac{3 - 5}{3} = -\frac{2}{3}.$$

Answer: $-\frac{2}{3}$

d. [3 points] Suppose $h(x) = 3 + 4x$. What transformations must be performed on the graph of $y = g(x)$ to obtain the graph of $y = h(g(x))$?
(*Be specific and give the transformations in the appropriate order.*)

Solution: We have $h(g(x)) = 3 + 4g(x)$, so we can obtain the graph of $h(g(x))$ from the graph of $g(x)$ by first stretching vertically by a factor of 4 and then shifting the resulting graph up 3 units. (Alternatively, we could first shift up 3/4 of a unit and then stretch the resulting graph vertically by a factor of 4.)

5. [9 points] A diver jumps up off of a diving board into a swimming pool below. Until the moment the diver enters the water, his height above the water (measured in feet) t seconds after his feet leave the diving board is $h(t) = -16t^2 + 8t + 10$.
Throughout this problem, remember to show your work and reasoning.
Give your answers in exact form or accurate to at least three decimal places.

a. [3 points] Use the method of completing the square to rewrite the formula for $h(t)$ in vertex form. (*Carefully show your work step-by-step.*)

Solution: Applying the method of completing the square, we have

$$\begin{aligned} h(t) = -16t^2 + 8t + 10 &= -16\left(t^2 - \frac{1}{2}t\right) + 10 \\ &= -16\left(t^2 - \frac{1}{2}t + \left(-\frac{1}{4}\right)^2 - \left(-\frac{1}{4}\right)^2\right) + 10 = -16\left(\left(t - \frac{1}{4}\right)^2 - \frac{1}{16}\right) + 10 \\ &= -16\left(t - \frac{1}{4}\right)^2 + 1 + 10 = -16\left(t - \frac{1}{4}\right)^2 + 11 \end{aligned}$$

Answer: $h(t) =$ $-16\left(t - \frac{1}{4}\right)^2 + 11$

b. [2 points] After how many seconds does the diver reach his maximum height above the pool? What is that maximum height?

Solution: Based on the vertex form found in part (a), the vertex of the graph of $h(t)$ (which is a parabola) is $(1/4, 11)$. Since the leading coefficient is negative, the parabola opens downward and this vertex gives the maximum of $h(t)$.

After 0.25 seconds, the diver reaches his maximum height of 11 feet.

c. [2 points] After how many seconds does the diver enter the water?

Solution: We must solve the equation $h(t) = 0$. Using our vertex form from part (a), we have

$$-16\left(t - \frac{1}{4}\right)^2 + 11 = 0 \quad \text{so} \quad -16\left(t - \frac{1}{4}\right)^2 = -11 \quad \text{and} \quad \left(t - \frac{1}{4}\right)^2 = \frac{11}{16}.$$

$$\text{Hence} \quad t - \frac{1}{4} = \pm\sqrt{\frac{11}{16}} = \pm\frac{\sqrt{11}}{4} \quad \text{so} \quad t = \frac{1 \pm \sqrt{11}}{4}.$$

Note that $\frac{1 - \sqrt{11}}{4} < 0$ so $\frac{1 + \sqrt{11}}{4} \approx 1.0792$ is the solution corresponding to a time after the diver left the diving board. (Alternatively, we could apply the quadratic formula to the original formula for $h(t)$ or use a graphing calculator to approximate the positive zero of $h(t)$.)

The diver enters the water $\frac{1 + \sqrt{11}}{4}$ seconds after his feet leave the diving board.

d. [2 points] In the context of this problem, what are the domain and range of $h(t)$?
(*Use either inequalities or interval notation to give your answers.*)

Domain: $\left[0, \frac{1 + \sqrt{11}}{4}\right]$ **Range:** $[0, 11]$

6. [9 points] The tables below provide data from three functions, f, g, and h. Each of these functions is either a *linear* function, an *exponential* function, a *sinusoidal* function, or a *power* function. (Note that there may be either zero, one, or more than one function of each type.)

x	-2	-1	1	2
f(x)	12	1.5	-1.5	-12

x	-3	-1	1	3
g(x)	12	6.5	1	-4.5

x	1	3	5	7
h(x)	32.4	10.8	3.6	1.2

a. [3 points] What type of function is f? (*Circle* ONE *answer.*)

linear exponential sinusoidal [power]

Find a formula for $f(x)$. (*Show your work carefully and use* exact form.)

Solution: $f(x)$ is a power function so there are constants k and p so that $f(x) = kx^p$. Note that $f(x) = -1.5$, so $-1.5 = k(1)^p = k(1) = k$. So $f(x) = -1.5x^p$. Now $f(2) = -12$ so $-12 = -1.5(2)^p$, so $8 = 2^p$ and $p = 3$. Thus a formula for $f(x)$ is $f(x) = -1.5x^3$.

Answer: $f(x) =$ $-1.5x^3$

b. [3 points] What type of function is g? (*Circle* ONE *answer.*)

[linear] exponential sinusoidal power

Find a formula for $g(x)$. (*Show your work carefully and use* exact form.)

Solution: We see that $g(x)$ is linear by noting that the average rate of change between each pair of consecutive inputs is constant (-2.75). $g(x)$ is linear with (constant) average rate of change equal to -2.75. Using point-slope form (with the point $(1, 1)$) we find that $g(x) - 1 = -2.75(x - 1)$ so $g(x) = 1 - 2.75(x - 1)$. (This reduces to $g(x) = 3.75 - 2.75x$ in slope-intercept form.)

Answer: $g(x) =$ $1 - 2.75(x - 1) = 3.75 - 2.75x$

c. [3 points] What type of function is h? (*Circle* ONE *answer.*)

linear [exponential] sinusoidal power

Find a formula for $h(x)$. (*Show your work carefully and use* exact form.)

Solution: (*)Note that the ratio of consecutive outputs is constant (1/3) and the the difference between consecutive inputs is also constant (2).
Hence $h(x)$ appears to be exponential. There are constants a and b so that $h(x) = ab^x$. Using the facts that $h(1) = 32.4$ and $h(3) = 10.8$ we have $ab = 32.4$ and $ab^3 = 10.8$. Hence, we see that $\frac{ab^3}{ab} = \frac{10.8}{32.4}$ so $b^2 = \frac{1}{3}$. (This is what we had already determined in (*) above.) Thus $b = \sqrt{\frac{1}{3}}$ so $a\sqrt{\frac{1}{3}} = 32.4$ and $a = \frac{32.4}{\sqrt{\frac{1}{3}}} = 32.4\sqrt{3}$.

Answer: $h(x) =$ $32.4\sqrt{3}\left(\frac{1}{\sqrt{3}}\right)^x = 32.4\sqrt{3}(3^{-x/2}) = 32.4(3)^{(1-x)/2}$

7. [8 points] Consider the polynomials and $a(x) = (x+1)(x^2 - 6x + 3)$ and $b(x) = x(3x^2 + 2)$.

a. [3 points] Find all the zeros of $a(x)$ and of $b(x)$.
(Show your work carefully, and give your answers in *exact form*.)

Solution: To find the zeros of $a(x)$, we solve $a(x) = 0$.

$$\begin{aligned} a(x) &= 0 \\ (x+1)(x^2-6x+3) &= 0 \\ x+1 = 0 \text{ or } x^2 - 6x + 3 &= 0 \\ x = -1 \text{ or } x &= \frac{6 \pm \sqrt{36 - 4(3)}}{2} \\ x = -1 \text{ or } x &= 3 \pm \sqrt{6} \end{aligned}$$

Similarly, we solve $b(x) = 0$.

$$\begin{aligned} b(x) &= 0 \\ x(3x^2+2) &= 0 \\ x = 0 \text{ or } 3x^2 + 2 &= 0 \end{aligned}$$

$3x^2 + 2 = 0$ has no real solutions (since $3x^2 = -2$ has no real solutions), so the only zero of $b(x)$ is $x = 0$.

zero(s) of $a(x)$**:** $x = -1$, $x = 3 + \sqrt{6}$, $x = 3 - \sqrt{6}$ **zero(s) of** $b(x)$**:** $x = 0$

b. [5 points] Let $r(x) = \dfrac{a(x)}{b(x)}$.

Find all intercepts and all horizontal and vertical asymptotes of the graph of $y = r(x)$.
If appropriate, write "NONE" in the answer blank provided.

Solution: Since $a(x)$ and $b(x)$ have no common zeros, the x-intercept(s) of the graph of $y = r(x)$ are the zeros of $a(x)$ and the vertical asymptote of the graph of $y = r(x)$ is given by the zero of $b(x)$.
The y-intercept of the graph of $y = r(x)$ is $r(0) = \frac{a(0)}{b(0)}$ which is undefined since $b(0) = 0$.
To find the horizontal asymptote of $r(x)$, recall that in the long-run, the polynomials $a(x)$ and $b(x)$ behave like their leading terms, which are x^3 and $3x^3$, respectively. Hence, in the long-run, $r(x)$ behaves like $\dfrac{x^3}{3x^3} = \dfrac{1}{3}$ so $\lim\limits_{x\to\infty} = \dfrac{1}{3}$ and $\lim\limits_{x\to-\infty} = \dfrac{1}{3}$. Hence the horizontal asymptote of the graph of $y = r(x)$ is $y = \dfrac{1}{3}$.

x**-intercept(s):** -1, $3 + \sqrt{6}$, **and** $3 - \sqrt{6}$

y**-intercept(s):** **None**

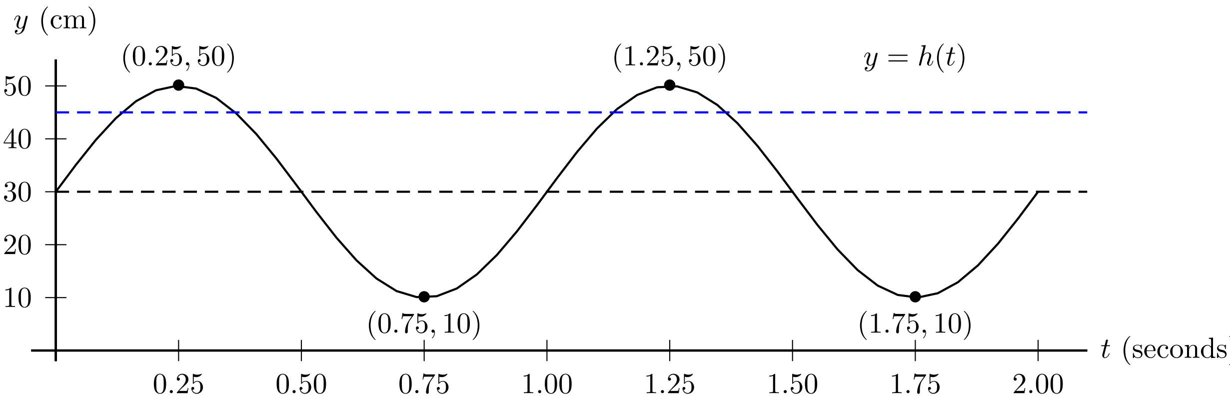
horizontal asymptote(s): $y = \dfrac{1}{3}$

vertical asymptote(s): $x = 0$

8. [12 points] Suppose Cato is riding a stationary exercise bicycle. His foot moves a pedal in a circle. Let $h(t)$ be the height (in cm) of the pedal above the ground at time t (in seconds). A formula for $h(t)$ is given by

$$h(t) = 20\sin(2\pi t) + 30.$$

a. [3 points] On the axes provided below, graph *two periods* of the function $P = h(t)$ starting with $t = 0$. (*Clearly label the axes and important points on your graph. Be very careful with the* **shape** *and* **key features** *of your graph.*)



b. [2 points] Find the period and amplitude of $P = h(t)$. (*Include units.*)

Period: 1 **second** **Amplitude:** 20 **cm**

c. [4 points] Find all the times t for $0 \le t \le 2$ when the pedal is exactly 45 cm above the ground. (*Find at least one answer algebraically. Show your work carefully and check that your answers make sense.*)

Solution: We are to solve $h(t) = 45$ for $0 \le t \le 2$. The line $y = 45$ has been included in the graph for problem (a). Note that there are 4 points of intersection between $y = 45$ and $h(t) = 45$ for $0 \le t \le 2$. These give us exactly four solutions to the equation $h(t) = 45$ for $0 \le t \le 2$. First we find one solution algebraically:

$$\begin{aligned} h(t) &= 45 \\ 20\sin(2\pi t) + 30 &= 45 \\ 20\sin(2\pi t) &= 15 \\ \sin(2\pi t) &= \frac{3}{4} = 0.75 \end{aligned}$$

One solution is thus given by $2\pi t = \arcsin(0.75)$ which gives $t = \dfrac{\arcsin(0.75)}{2\pi} \approx 0.135$. (This is the smallest of the four solutions.) Note that by symmetry, the next solution is as far to the left of 0.5 as the first solution was to the right of the y-axis. (Alternatively, the average of the first two solutions is 0.25.) Hence the second solution is $0.5 - \dfrac{\arcsin(0.75)}{2\pi} \approx 0.365$. The other two solutions are exactly one period later on the graph, so they are equal to $1 + \dfrac{\arcsin(0.75)}{2\pi} \approx 1.135$ and $1 + \left(0.5 - \dfrac{\arcsin(0.75)}{2\pi}\right) \approx 1.365$.

Answer(s): $t \approx 0.135, 0.365, 1.135,$ **and** 1.365 **seconds**

d. [3 points] Find the length of the arc through which the pedal travels between $t = 0$ and the time the pedal *first* reaches a height of exactly 45 cm.
(*Show your work and reasoning. It may help to sketch a picture.*)

Solution: Since the amplitude of the function $h(t)$ is 20 cm, we see that the radius of the circle around which the pedal is traveling is 20 cm. The pedal is at the 3 o'clock position and ascending at time $t = 0$ and its height above the ground after traveling through an angle of ϕ radians is $20\sin(\phi) + 30$ cm. When it first reaches a height of 45 cm, we have $20\sin(\phi) + 30 = 45$, so $\sin(\phi) = 0.75$. The solution $\phi = \arcsin(7.5)$ corresponds to the first time the pedal reaches 45 cm (as in part (c)). The arc length of the path the pedal had traveled is then $20\arcsin(0.75) \approx 16.96$ cm.

Answer(s): $20\arcsin(0.75) \approx 16.96$ **cm**

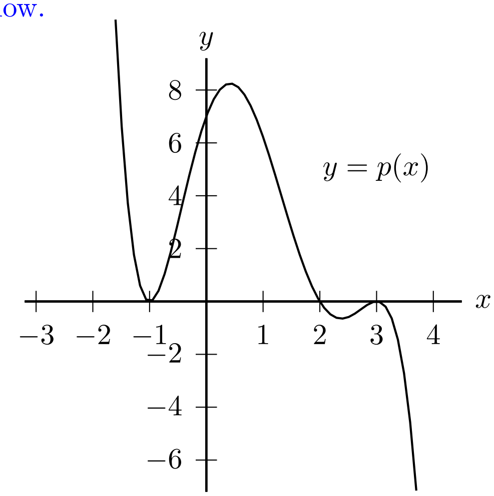
9. [5 points] Find a formula for *one* polynomial $p(x)$ that satisfies *all* of the following conditions.

- The vertical intercept of the graph of $p(x)$ is 7.
- The graph of $p(x)$ has horizontal intercepts -1, 2, and 3 (and no others).
- $\lim_{x\to\infty} p(x) = -\infty$ and $\lim_{x\to-\infty} p(x) = \infty$.
- The degree of $p(x)$ is at most 6.

Show your work and reasoning carefully. You might find it helpful to first sketch a graph. There may be more than one possible answer, but you should give only one answer.

Solution:

A graph showing such a polynomial is shown below.



To find a formula, note that the factored form of such a polynomial could be

$$p(x) = a(x+1)^2(x-2)(x-3)^2.$$

The vertical intercept is given by $p(0)$ so we use the fact that $p(0) = 7$ to determine a. That is

$$7 = p(0) = a(0+1)^2(0-2)(-3)^2 = a(-18),$$

so $a = -\frac{7}{18}$. Hence a possible formula is $p(x) = -\frac{7}{18}(x+1)^2(x-2)(x-3)^2$.

Note: Another possibility (corresponding to a double root at $x = 3$ rather than at $x = 2$) would be $p(x) = -\frac{7}{12}(x+1)^2(x-2)^2(x-3)$

$p(x) =$ $-\dfrac{7}{18}(x+1)^2(x-2)(x-3)^2$ **or** $-\dfrac{7}{12}(x+1)^2(x-2)^2(x-3)$

10. [4 points] If $K = G(t) = \dfrac{e^t + 3}{7 + e^t}$ find a formula for $G^{-1}(K)$.

Solution: To find a formula for $G^{-1}(K)$ we need to solve for t in the equation $K = \dfrac{e^t+3}{7+e^t}$.

$$\begin{aligned}
K &= \frac{e^t+3}{7+e^t}\\
K(7+e^t) &= e^t + 3\\
7K + Ke^t &= e^t + 3\\
Ke^t - e^t &= 3 - 7K\\
e^t(K-1) &= 3 - 7K\\
e^t &= \frac{3-7K}{K-1}\\
t &= \ln\left(\frac{3-7K}{K-1}\right)
\end{aligned}$$

Answer: $G^{-1}(K) =$ $\ln\left(\dfrac{3-7K}{K-1}\right)$

11. [8 points] Every morning, a student gets a cup of coffee from a local coffee shop and then sits down to work. Today the coffee was served at a temperature of 185°F. Let $C(t)$ be the temperature, in degrees Fahrenheit, of the cup of coffee t hours after it was poured today, and let $D(t) = C(t) - 70$.

Throughout this problem, show your work carefully and give all answers in exact form or accurate to at least three decimal places.

a. [1 point] Find $D(0)$.

Solution: $D(0) = C(0) - 70 = 185 - 70 - 115$.

Answer: $D(0) =$ 115

b. [2 points] $D(t)$ is an exponential function with a *continuous* hourly decay rate of 80%. Find a formula for $D(t)$ and then find a formula for $C(t)$

Solution: In part (a), we found that the initial value of D is 115, so $D(t) = 115e^{-0.8t}$. Since $D(t) = C(t) - 70$ we have $C(t) = 70 + D(t) = 70 + 115e^{-0.8t}$.

$D(t) =$ $115e^{-0.8t}$ $C(t) =$ $70 + 115e^{-0.8t}$

c. [1 point] By what percent does $D(t)$ decrease each hour?

Solution: The hourly decay factor is $b = e^{-0.8} \approx 0.44933$ so $D(t)$ decreases by about 55.067% per hour.

Answer: **by about** 55.067%

d. [2 points] By how many degrees did the temperature of the cup of coffee decrease within the first 30 minutes after it was poured?

Solution: The temperature, in degrees Fahrenheit, of the coffee when it was poured was $C(0) = 185$ and its temperature (in °F) 30 minutes after it was poured was

$$C(0.5) = 70 + 115e^{-0.8(0.5)} \approx 147.09.$$

So the temperature of the coffee decreased by

$$C(0) - C(0.5) = 185 - (70 + 115e^{-0.8(0.5)}) \approx 37.91°\text{F}$$

within the first 30 minutes after it was poured.

Answer: **by about** 37.91**°F**

e. [2 points] Find and interpret, in the context of this problem, any horizontal asymptotes of the function $C(t)$.

Solution: $D(t)$ is an exponentially decreasing positive function so it has horizontal asymptote $y = 0$ ($D(t) \to 0$ as $t \to \infty$). $C(t) = D(t) + 70$ so its graph is obtained from the graph of $D(t)$ by shifting up 70 units. Hence the graph of $y = C(t)$ has horizontal asymptote $\boxed{y = 70}$ (and $C(t) \to 70$ as $t \to \infty$).

Interpretation: As time passes, the temperature of the coffee approaches 70°F. (This is probably the air temperature in the coffee shop.)

12. [8 points] In preparation for an upcoming party, you are deciding where to buy a large supply of candy. You have investigated two sources. Define functions C and T as follows.

- It costs $C(p)$ dollars to buy p pounds of candy from the Candy Company.
- For d dollars, you can buy $T(d)$ pounds of candy from Tasty Sweets.

Assume that both C and T are invertible.

a. [1 point] Write an equation that expresses the fact that it costs \$25 to buy 10 pounds of candy from Tasty Sweets.

Answer: $T(25) = 10$ **(or** $T^{-1}(10) = 25$**)**

b. [1 point] Write an expression that gives the cost of purchasing k pounds of candy from Tasty Sweets.

Answer: $T^{-1}(k)$

c. [2 points] Write an equation that expresses the fact that it costs \$10 more to buy 20 pounds of candy from the Candy Company than to buy 15 pounds of candy from the Candy Company.

Answer: $C(20) = C(15) + 10$

d. [2 points] The Candy Company claims that purchasing twice as much candy always costs less than twice as much. Express this statement as an inequality involving C and p.

Answer: $C(2p) < 2C(p)$

e. [2 points] Interpret the meaning of the equation $T(C(15)) = 20$ in the context of this problem. (*Use a complete sentence.*)

Solution: For the price of buying 15 pounds of candy from the Candy Company, you can buy 20 pounds of candy from Tasty Sweets.
Alternative: It costs the same amount of money to buy 20 pounds of candy from Tasty Sweets as it does to buy 15 pounds of candy from the Candy Company.

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13. [5 points] (Your score on this problem was determined when you took the LA Post-Test.)