

1. **True** or **False**—no explanation necessary. Circle **True** only if the statement is *always* true. You are encouraged to answer these problems only if you are sure of your answer.

Scoring will be:

- 2 points for each correct answer,
- 0 points for not answering, and
- -1 point for each incorrect answer.

Assume that all functions are continuous and differentiable.

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|-----|---|-------------|--------------|
| (a) | If $f$ is increasing, then $f'$ is increasing.  | <b>True</b> | <b>False</b> |
| (b) | If $y = \pi^5$ , then $y' = 5\pi^4$ .   | <b>True</b> | <b>False</b> |
| (c) | If $f'$ is increasing, then the graph of $f$ lies above the graph of any line that is tangent to the curve. | <b>True</b> | <b>False</b> |
| (d) | If $f''(a) = 0$ , then $f$ has an inflection point at $x = a$ .   | <b>True</b> | <b>False</b> |
| (e) | If $f''$ is negative at a critical point, then $f$ has a local maximum at that point.                       | <b>True</b> | <b>False</b> |
| (f) | If $a \neq b$ , then $\int_a^b f(x) dx \neq 0$ .  | <b>True</b> | <b>False</b> |
| (g) | If $f(x) \leq g(x)$ for all $x$ on the interval $[2, 6]$ , then $\int_2^6 [g(x) - f(x)] dx \geq 0$ .        | <b>True</b> | <b>False</b> |
| (h) | If $\int_a^b (2f(x) + g(x)) dx = 5$ and $\int_a^b g(x) dx = 2$ , then $\int_a^b f(x) dx = 3$ .              | <b>True</b> | <b>False</b> |