

## Quiz 9 Solution - Math 165

Name: \_\_\_\_\_

Show all work to receive maximum credit for each problem. You may not use your book, notes, or a calculator on this quiz. Give exact answers, not decimal approximations. This quiz is worth 25 points.

1. (5 points) Evaluate

$$\int_0^1 (x^3 + 2x) dx$$

$$\text{Solution: } = \left[ \frac{x^4}{4} + x^2 \right]_0^1 = \frac{5}{4}$$

2. (5 points) Evaluate

$$\int_0^{\pi/2} \sin(x) dx$$

$$\text{Solution: } = [-\cos(x)]_0^{\pi/2} = 1$$

3. (5 points) Evaluate

$$\int_0^6 \frac{1}{\sqrt{2x+4}} dx$$

$$\text{Solution: } = \frac{1}{2} [2\sqrt{2x+4}]_0^6 = 4 - 2 = 2$$

4. (5 points) Evaluate  $\frac{d}{dx} \left( \int_x^3 (t^7 - 9t) dt \right)$

$$\text{Solution: } = -(x^7 - 9x) = 9x - x^7$$

5. (5 points) Assume  $f(x) \leq g(x)$  for all  $x$  in  $[a, b]$ . Prove that  $\int_a^b [g(x) - f(x)] dx \geq 0$ .

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$$\text{Solution: } f(x) \leq g(x) \Rightarrow \int_a^b f(x) dx \leq \int_a^b g(x) dx \Rightarrow 0 \leq \int_a^b g(x) dx - \int_a^b f(x) dx \Rightarrow 0 \leq \int_a^b [g(x) - f(x)] dx$$