Mathematics 141 Test #3   Name: _____

Show your work to get credit. An answer with no work will not get credit.

(1) (40 points) Compute the following antiderivatives.

(a) $\int (3x^4 - 4x^3 + 2x^2 - 7x + 3)\, dx$

_____

(b) $\int (t^2 - 4\pi^3)\, dt$

_____

(c) $\int \left(\dfrac{3}{y^2} + 4\sqrt{y} \right) dy$

_____

(d) $\int \dfrac{x^4 + 1}{x^2}\, dx$

_____

(e) $\int (3\cos\theta + 4\sin\theta)\, d\theta$

_____

(f) $\int x\sqrt{x^2 + 4}\, dx$

_____

(g) $\int \cos(2\theta + \pi) \, d\theta$

_____

(h) $\int \sin^5(t) \cos(t) \, dt$

_____

(2) (15 points) Compute the following definite integrals.

(a) $\int_0^2 (x^2 + 2x + 3) \, dx$

_____

(b) $\int_0^\pi \sin 3t \, dt$

_____

(c) $\int_0^1 \frac{x}{(x^2 + 1)^2} \, dx$

_____

(3) (5 points) If $f'(x) = 1 + 2x$ and $f(1) = 4$, then what is $f(x)$? $f(x) =$

_____

(4) (5 points) What is the average value of $f(x) = 2x+3$ on the interval $[1, 3]$?   _____

(5) (5 points) State the mean value theorem.

(6) (10 points) Graph $y = \dfrac{x^2 + 1}{x}$ showing all horizonal and vertical asymptotes, critical points, local maxima and minima, and inflection points.

(7) (10 points) Use the fundemential theorem of calculus to find:

(a) $\dfrac{d}{dx} \displaystyle\int_0^x \sqrt{1+t^3}\, dt =$

(b) (10 points) $\dfrac{d}{dx} \displaystyle\int_0^{2x+1} \sqrt{1+t^3}\, dt =$

(8) (10 points) Find the area between the curves $y = 3x^2$ and $y = x^3$.

Area = _____