Calculus **B** 0314

Quiz 7.

(1) Find an equation of the tangent to the curve at the point corresponding to the given value of the parameter. (10%) $y = -x$.

$$x = t^4 + 1, \quad y = t^3 + t; \quad t = -1.$$

(2) Find dy/dx and d^2y/dx^2. For which values of t is the curve concave upward? (10%)

$$x = 2\sin t, \quad y = 3\cos t, \quad 0 < t < 2\pi. \quad \frac{-3}{2}\tan t, \quad \frac{-3}{4}\sec^3 t. \quad \frac{\pi}{2} < t < \frac{3\pi}{2}.$$

(3) Use the parametric equations of an ellipse, $x = a\cos\theta$, $y = b\sin\theta$, $0 \le \theta \le 2\pi$, to find the area that it encloses. (10%) $ab\pi$.

(4) Set up, but not evaluate, an integral that represents the length of the curve. (10%)

$$x = t + \cos t, \quad y = t - \sin t, \quad 0 \le t \le 2\pi. \quad \int_0^{2\pi} \sqrt{3 - 2\sin t - 2\cos t}\, dt.$$

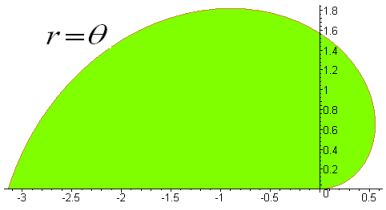
(5) Find the area of the surface obtained by rotating the given curve about the x-axis. (10%)

$$x = t^3, \quad y = t^2, \quad 0 \le t \le 1. \quad \frac{2(247\sqrt{13} + 64)}{1215}\pi.$$

(6) Find the slope of the tangent line to the given polar curve at the point specified by the value of θ. (10%)

$$r = 2\sin\theta, \quad \theta = \frac{\pi}{6}. \quad \sqrt{3}.$$

(7) Find the area of the shaded region. (10%) $\frac{\pi^3}{6}$.



(8) Find the area of the region that lies inside both curves. (10%)

$$r = \sin 2\theta, \quad r = \cos 2\theta. \quad \frac{\pi}{2} - 1$$

(9) Find the exact length of the polar curve: $r = \theta^2$, $0 \le \theta \le 2\pi$. (10%) $\frac{8}{3}[(\pi^2 + 1)^{\frac{3}{2}} - 1]$.

(10) Find the area of the surface obtained by rotating the given curve about the x-axis. (10%)

$$x = 4\sqrt{t}, \quad y = \frac{t^3}{3} + \frac{1}{2t^2}, \quad 1 \le t \le 4. \quad \frac{471295}{1024}\pi.$$